

**APPLICATION FOR UNITED STATES LETTERS PATENT**

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**METHOD AND APPARATUS FOR LOCAL STORAGE  
AND INSERTION OF TELEVISION COMMERCIALS**

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# METHOD AND APPARATUS FOR LOCAL STORAGE AND INSERTION OF TELEVISION COMMERCIALS

## 5 FIELD OF THE INVENTION

The present invention relates to a set top box apparatus for receiving media broadcast through cable television or digital satellite systems, and more particularly, to a method and apparatus for selecting and inserting commercial advertisements into television programming.

## 10 DESCRIPTION OF THE RELATED ART

15 Since the origin of home television in the 1940's, a primary source of revenue for television networks has been through paid advertisements that are interspersed between television programming of entertainment or news information as "commercials" for products and services. Typically 15 to 60 seconds in length, television commercials are grouped together as pre-defined breaks in the broadcast of a television show, occurring after every few minutes of television programming. It is known that in every one hour of television programming, there are approximately sixteen (16) minutes of commercials. The number of commercials and the timing between placement of the commercials are often dependent upon the type of television show (i.e., sporting event, game show, movie, or sitcom) or the format of the program (i.e., live or pre-  
20 recorded).

Television advertising is generally more effective when aired during popular television programs that are watched by many viewers who are interested in buying the types of products or services that are advertised. In determining whether a television program may be appropriate for particular advertisements, advertisers typically consider whether the program attracts large  
25 numbers of viewers who are in the same age group, gender, and income level, and have similar

interests with those who tend to purchase the products to be advertised. Selecting the placement of advertising in this manner increases the likelihood that viewers who watch the advertisement will be interested in or may otherwise influence household purchasing decisions concerning products advertised during the program.

5           Although the process of selecting advertisements for television programs according to viewer demographics can be effective, broadcast television commercial advertising remains inherently inefficient because the same advertisement is shown to the entire audience of a television program. For example, while some viewers of a television game show program may be interested in a television commercial for a convertible automobile, others may be more  
10           interested in an advertisement for a minivan or sport utility vehicle. Because a single commercial advertisement cannot be tailored to the unique interests of each individual viewer, the advertisements are usually of little interest to a significant portion of the viewers. As a consequence, commercial advertisements are often disregarded by a large percentage of viewers.

15           Television networks typically reserve a portion of advertising time slots for local television stations to run advertisements for local businesses or public service announcements that affect the local television audience. In the present broadcast system, the same local advertisement is played to all recipients of the television broadcast signal, regardless of the viewers' particular locations within the broadcast area. In many circumstances, this method of local advertising is inefficient because a local advertisement only applies to viewers in one  
20           portion of the broadcast area. For example, although a television station may broadcast commercials to all viewers within a fifteen-mile radial distance of the broadcast tower, a commercial for an automobile dealership that is fifteen miles north of the television station may be irrelevant to a viewer who is located fifteen miles south of the television station. It is highly

unlikely that the viewer will buy an automobile from the advertised dealership if there are many other dealerships that are more conveniently located. Accordingly, the inability to target advertisements to viewers according to location within a local broadcast area reduces the effectiveness and thereby increases the cost of local television advertising.

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## SUMMARY OF THE INVENTION

In view of the difficulties described above, there is a need for a method and system for inserting television commercials that are selected according to the unique interests and purchasing habits of viewers in individual households, or the relative location of the household within a local broadcast area. The present system provides a cable or satellite television set top box that stores a plurality of television commercials for products or services that have been found to be of interest to viewers in a household that uses the set top box. At commercial breaks during the broadcast of network television programs, the television network indicates when the set top box is authorized to insert a stored television commercial instead of a broadcast commercial. If the set top box locates a locally stored commercial that is appropriate for the television program and the user, the commercial is inserted into the commercial break. In this manner, the television commercials correlate more closely with the viewer's interests or location, thereby improving the efficiency and effectiveness of commercial advertising.

It is an object of the present invention to provide a method for inserting targeted advertisements into a media delivery stream during broadcast media programming. A plurality of advertisements are stored in a media delivery device in a database, and the stored advertisements are each of a type that is determined to appeal to one or more users of the media delivery device. A signal is received in the media delivery device to insert a stored

advertisement into the media delivery stream during broadcast media programming. An advertisement stored in the database is then inserted into the media delivery stream.

It is a further object of the present invention to provide a media delivery device for inserting targeted advertisements into a media delivery stream. A receiver receives broadcast media programming into the media delivery device. A commercials database stores advertisements in the media delivery device. A commercial detector detects signals to insert a locally stored advertisement from the commercials database into the media stream. Advertisements received through broadcast media programming can be substituted with an advertisement stored in the commercials database.

It is yet another object of the present invention to provide a method for inserting television commercials stored in a set top box connected to a television into a media programming stream. A plurality of television commercials advertising products or services for local business concerns are stored in a database, wherein the advertised products are each of a type that has been determined to appeal to one or more users of the set top box. A signal is received in the media programming stream from a broadcasting network to insert a television commercial for a local business concern during a segment of airtime allocated for local commercial advertising. A television commercial stored in the database is then inserted into the media programming stream.

A further object of the present invention is to provide a system for inserting television commercials stored locally in a television set top box into a media programming stream. A receiver receives broadcast media programming into the set top box. A commercials database stores advertisements in the media delivery device. A commercials detector detects a substitution signal in broadcast media programming that indicates authorization for a local

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television station to insert a locally stored advertisement into the media stream. A switch in the set top box output temporarily disconnects a television connected to the set top box from the media programming stream and temporarily connects the television to receive a television commercial stored in the commercials database when the substitution signal is detected in the commercials detector.

**BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is a schematic diagram of a set top box according to a preferred embodiment of the present invention.

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FIG. 2 is a flow diagram for storing television commercial advertisements in a database in the set top box of Fig. 1 according to the preferred embodiment of the present invention.

FIG. 3 is a flow diagram for storing television commercial advertisements in a database in the set top box of Fig. 1 according to an alternative embodiment of the present invention.

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FIG. 4 is a table of an exemplary header database in the memory of the set top box of Fig. 1.

FIG. 5 is a flow diagram for inserting commercials stored in the set top box of Fig. 1 into a television program according to the preferred embodiment of the present invention.

FIG. 6 is an illustration of an example for inserting commercials into a television program according to the preferred embodiment of the present invention.

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**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

The preferred embodiment of the present invention provides a set top box for a cable television or satellite television system that stores television commercials in a local memory and

periodically inserts commercials during commercial breaks that have been determined to be pertinent to a viewer's individual interests.

The present invention will now be described in more detail with reference to the figures. FIG. 1 is a schematic diagram of a set top box 10 according to the preferred embodiment of the present invention. The set top box receives encoded television signals either from satellite receiver 11a or cable feed line 11b, which is fed to a tuner/demodulator 12 for receiving digital signals. The tuner/demodulator 12 tunes to the frequency of a broadcast stream that is selected by a user. The tuner/demodulator 12 feeds into an MPEG-2 decoder 13a in a central processing unit 13 in set top box 10. The tuner 12 tunes to the frequency of a selected MPEG-2 transport stream, which is then decoded in the MPEG-2 decoder 13a and fed to the television.

Programming subscription memory 13b in CPU 13 maintains a list of television stations that are available to the viewer in accordance with the subscription plan arranged by the user of the set top box. In order to select a channel, CPU 13 receives infra red (IR) signals from a remote control changer via remote control infra red sensor 15. The selected signal is decoded and divided into stereo audio and video signals, which are fed to the television via audio and video line out jacks 16a and 16b, respectively. Television programs can be stored for replay using replay processor 13c and replay storage 19.

Set top box 10 also includes a network connection/modem 14, by which the box 10 can transmit and receive data from the cable or satellite television system provider. The network connection may be an ADSL modem. Other upstream transmission devices are also possible, such as a DOCSIS cable modem, or a 56K baud modem over a telephone line, but an ADSL connection is preferred. In known satellite television systems, the set top box initiates a call to the satellite system service provider to provide billing information and to credit the user's

account for pay-per-view or movie-on-demand requests and transactions. As will be described below, a telephone modem can be used in the present invention to request and receive television commercials that are to be locally stored in the set top box 10 and inserted during television programming on the subscriber's television system. An ADSL line is preferred to a presently available 56K baud modem because of the reduced download time.

The set top box 10 of the present invention additionally includes television commercial advertising detector 17 and commercials database 18. Commercials detector 17 detects signals from the satellite or cable line 11a or 11b that indicate when the set top box is authorized to substitute locally stored commercials during a commercial break. The CPU then searches for an appropriate, locally stored commercial in the header database 18a of the commercials database 18. If an appropriate commercial is located, it is extracted from main storage 18b and substituted for the regularly scheduled commercial to be transmitted by the network.

Television broadcasting networks currently transmit a multi-tone audio signal just prior to the broadcast of certain television commercials. This signal indicates that the advertising time slot is reserved for a local, rather than national commercial advertisement. Upon detecting this signal, the local broadcasting network inserts a local advertisement into the broadcast stream, which is then transmitted to all households that receive television signals from that network. Computer systems at the local television network automatically insert local commercials into the broadcasting stream without creating any pause or delay in the broadcasting. The local television network computer systems remove, or "step on" the multi-tone audio signal transmitted by the national network once it is detected, such that the operation is usually not perceptible by the viewer.

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In the present invention, the commercials detector 17 in the set top box 10 operates similarly to the tone detector system at the local television network stations. Digital signals that are transmitted by satellite or via cable are encoded in MPEG-2 format. The relevant specification for the transmission of audio, video, and data is ISO/IEC 13818-1. MPEG-2 provides for private data transmission interleaved with the audio/video data. When a commercial is to be transmitted during a commercial break, an MPEG-2 data signal is transmitted over the broadcast stream for detection by the commercials detector 17. A signal is then communicated to the CPU 13 to search for another commercial to insert as a substitute for the commercial that is about to be transmitted. If an appropriate commercial is located in commercials database 18, the CPU 13 temporarily switches the signal to the audio/video signal line out 16a, 16b to play the inserted commercial instead of the broadcast commercial. Switching is performed by the CPU, which switches the input of the MPEG-2 decoder from the broadcast stream to the locally stored commercial stream.

The system and method of the present invention can be utilized for inserting locally stored commercials in place of national-type advertisements, local advertisements, or a mixture of both. If the system is configured to enable the set top box to replace a national advertisement, the television network broadcaster must provide either a MPEG-2 encoded data signal, a multi-tone audio signal, or another type of analog or digital signal or indicator to alert the set top box to search for a locally stored commercial for insertion. If the system is configured to only replace local advertisements, it may be possible to utilize only the multi-tone signal that is already provided by the national networks for detection by the local television station.

A method for storing commercials into a set top box that are transmitted over an ADSL line is now described with reference to Fig. 2. In step 23, the set top box initiates a network

connection with the network service provider. The television network service provider may be a stand-alone, dedicated dial-in server, or a web server connected to the Internet via the world wide web. The CPU 13 in the set top box then transmits identification information to the service provider in step 24. The identification information is a smart card number, or CAS ID

5 (conditional access system ID) affiliated with the set top box.

Alternatively, the identification information could be comprised of a name, code number, or a series of numbers that enable the service provider to identify what types of commercials are to be downloaded into the set top box local memory. As examples, the identification information may consist of or otherwise include: one or more account numbers that uniquely identifies one or more respective users of the set top box; a serial number assigned to the set top box module; or a series of codes that correspond to the types of commercials that are pertinent to users of the particular set top box, or television programs that have been recently watched by users of the set top box. In a system for inserting commercials for local businesses, the identification information may include either the household address for the set top box or the region in which the set top box is located within the local broadcast area.

If the service provider receives a smart card number, CAS ID, or a serial number or account number, the information is then applied to a database at the server side, which then extracts the one or more codes corresponding to commercials that are pertinent to the accountholders.

20 The service provider then transmits encoded signals of television commercials, which are received into the set top box in step 25. The commercial data is transmitted as encoded MPEG-2 (ISO/IEC 13818-2) files. In step 26, the transmitted commercial data is stored in commercials database 18b for later playback. Commercial identification information is separately transmitted

and received, or is otherwise extracted from the transmitted signals and stored in step 27 in header database 18a.

If the set top box communicates to the network service provider through a standard POTS modem that operates on a shared telephone line in a household, the set top box 10 must first wait for an appropriate time to initiate a connection to the television network. The set top box 10 may initially be configured to place telephone calls at times when it would be unlikely for a telephone line to be in use in a household (e.g., between the hours of 2 am and 4 am). Before placing a telephone call with the telephone modem 14, the set top box system must then check whether the telephone line is presently in use. If the telephone line is busy, the system will wait until the line is no longer occupied before connecting with the network service provider.

A method according to a further alternative embodiment for storing commercials into a set top box that are received via the satellite/cable television network is now described with reference to Fig. 3. The CPU in set top box 10 of Fig. 1 waits until a download signal is received and decoded in MPEG-2 decoder 13a, in step 30. A channel is reserved by the broadcast network that only broadcasts commercials to be downloaded for local storage in set top boxes. The set top box may be configured to detect download signals during times when it is not in use. In the alternative, the set top box may include a separate decoder for receiving and storing incoming commercials while a user is watching television.

The set top box receives commercial identification and type information in step 31. If it is determined in step 32 that it is appropriate for the set top box to store commercials of the identified type, the system determines in step 33 whether the particular, identified commercial already has been stored. If not, the commercial data is received in step 34 and recorded into set top box memory and the header database in steps 35 and 36, respectively.

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Fig. 4 provides an example of a header database/commercial information table 18a that is stored in the local memory of set top box 10 of Fig. 1. The header database/commercial information table is used to give the set top box information necessary for recording, storage, and playback of commercials. As can be seen, the header database may include a plurality of fields. A “Commercial ID” field (4 bytes) uniquely identifies the stored commercial. A “Length” field (2 bytes) indicates the length of the commercial in milliseconds. A “Sponsor Name” field (20 bytes) provides a NULL terminated ASCII string of a sponsor name. A “Pricing” field (4 bytes, not shown in Fig. 4) indicates the price range of the product. The two most significant bytes indicate the upper end of the range (in dollars) and the least two significant bytes indicate the lower end of the range (in dollars).

The commercial information table may also include a field for “Number of Relevant Areas” (2 bytes, not shown in Fig. 4). This field indicates if the stored commercial is relevant over the entire broadcast area, or only in a local area. When this value is zero, the commercial is valid over the entire broadcast area. When this value is any other number, it indicates that the commercial is valid only in a list of areas provided in a subsequent field in the table. A “Relevant Areas” field (not shown in Fig. 4) is a list of broadcast areas for a particular commercial. A broadcast area is defined by the network in accordance with the size of the network and the size of the area divisions needed. Zip codes, cities, or latitude/longitude/radius sets can be used for this field.

The “Content Type” field (20 bytes, not shown in Fig. 4) describes the content type, and helps the set top box to categorize a commercial. This value should be used with bitmasks to categorize the commercial in a hierarchical fashion. That way, if a set top box cannot find an exact match for a commercial, it can find the closest match. The most general category types

should be masked with high order bits, while the most specific category types should be masked with low order bits. A value of zero should be used for each masked field to indicate “any” or “don’t care.” Content types match closely when the most number of lower order bits match (a match is considered true when the masked fields are the same, or one or the other is set to 0). As an example of usage for this field, the two most significant bits of the content type value may indicate the gender target of the commercial (0 = any, 1 = male, 2 = female), the next four most significant bits may indicate the age target (0 = any, 1 = 0 – 3, 2 = 3- 6, etc.), the next eight most significant bits may indicate a general theme (0 = any, 1 = sports, 2 = electronics, 3 = automobile, etc.), the next eight most significant bytes may indicate a more specific subset of the general theme, and so on.

According to a further embodiment of the present invention, the header database may also include fields that track or provide an indication of the effectiveness of the television commercial. Such fields may include the number of seconds that a commercial was viewed during the most recent playback before the user switched channels or the number of times that a commercial was viewed at full length. Tracking information that is stored in the header database also may be used internally by the set top box CPU in determining when a particular commercial is to be inserted, or whether an ineffective commercial should be deleted from the database. Such tracking information can also be communicated back to the network service provider via modem 14, and can be categorized and reported to corporate sponsors and television advertisers. Additionally, the information can be used by networks in marketing television programs to advertisers.

The process of inserting a locally stored television commercial into the broadcast stream on a set top box is now described with reference to Fig. 5. As signals are received for the

broadcast television program in step 50, the commercials detector 17 waits in step 51 for a signal from the network to insert a locally stored commercial. If, in step 52, the television set top box detects a signal indicating that the set top box can substitute a locally stored commercial instead of a commercial that is to be broadcast through the network, the CPU begins receiving search  
5 criteria in step 53 to locate an appropriate substitute commercial. As an example, among other criteria, the set top box may receive information indicating the length of the commercial that is to be substituted.

10 In step 54, the CPU 13 searches the header database for an appropriate commercial stored in the commercials database to insert into the broadcast stream. The search is conducted based upon information that is already known to the set top box and criteria that is supplied to the set top box in step 53. Many factors may be included in the algorithm by which the header database is searched to identify an appropriate commercial, including but not limited to: the type of  
15 television program being viewed; the corporate sponsor of the television program; the types of commercials already broadcast during the program; the hour of the day and the day of the week of the program; and the frequency by which each stored commercial has been inserted. The application of some of these factors to the search algorithm is now described.

The television networks may determine what types of commercials are appropriate for each type of television program (e.g., a sports drink commercial is not likely to be appropriate for a soap opera television program). This information may be communicated to the set top box  
20 by any of a variety of methods. As one possibility, the television network may broadcast an encoded signal at the beginning of each commercial break that indicates the types of locally stored commercials that may be appropriate for insertion. As an alternative, the television network may periodically transmit via modem such information for an entire programming

schedule for storage in the memory of the set top box. Using this information, the set top box will only choose from locally stored television commercials that are of a type that corresponds with the television program.

In some circumstances, an advertiser restricts a television network from broadcasting commercials of rival or competitor companies during the same television program. An advertiser may additionally require that the network refrain from broadcasting commercials that may otherwise seem inappropriate to the advertiser's intended audience (e.g., a juvenile products company may not wish to advertise during a television program that also includes alcohol advertisements). If an advertiser identifies competitors and other companies with which it does not desire to be affiliated, this information can then be transmitted during the beginning of a commercial or a commercial break, or can be also periodically stored in the memory of the set top box. The television commercials that are locally stored in the set top box may include in the header database the names of rival or competitor companies. During searches for appropriate, locally stored commercials, the set top box determines whether the corporate sponsorship of any of the commercials is in conflict with that of other commercials that are pre-designated to be played during the program.

As additional search criteria, the set top box may also consider the frequency or how recently each stored commercial has been inserted. If a locally stored commercial matches other criteria, but already has been inserted within the hour, it is likely to be disregarded by the set top box user. Similarly, the system may be configured to favor commercials that have not been frequently inserted when choosing between a plurality of otherwise appropriate commercials.

As can be seen, there are an infinite number of factors that can be incorporated as search criteria for identifying appropriate commercials for insertion and substitution into a broadcast

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stream. Many of these factors may be devised by the television network pursuant to advertising contracts with particular sponsors. For example, an automobile company may be determine that advertising is more effective when a national advertisement for the company is followed by a local advertisement for a participating automobile dealership. In such case, the automobile company or the corresponding automobile dealership may be amenable to paying higher fees for advertising time when the two advertisements are shown in combination. In these circumstances, the search criteria in the set top box will favor such combinations in order to maximize network revenue.

After performing a search in step 54 for an appropriate commercial that is locally stored in the set top box, the system next determines in step 55 whether any such commercial is available. If no locally stored commercial in the set top box adequately satisfies the search criteria, the set top box continues with the regularly scheduled television commercial broadcast by the network, and waits for another commercial break signal in step 51. If an appropriate commercial is available, the MPEG-2 decoder 13a in CPU 13 in step 56 disconnects from the incoming encoded stream and directly connects to commercials database 18. The television now shows the locally stored commercial instead of the commercial that is broadcast over the network in step 57. At the conclusion of the commercial, the CPU 13 again switches to decode the incoming encoded signal in step 58. In step 59, the record in the header database associated with the commercial that was played is updated. In addition to the method described with reference to Fig. 5 for temporarily disconnecting the broadcast signal from the television, there are many other possible methods of interrupting the broadcast to insert the locally stored commercial in the place of the commercial broadcast by the network. The broadcast can be interrupted through a switch or any series of conventional logic gates.

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An example of the method for inserting a locally stored television commercial is now described with reference to Fig. 6. In this example, an individual is watching a football game via a set top box receiver for digital satellite television. The set top box detects a signal indicating that a commercial slot is available for inserting a locally stored commercial for a local business. The signal also indicates that the network is broadcasting a commercial for “Alco,” a nationally known alcoholic beer, and the “Force” automobile company during the same commercial break. Finally, the signal also lists the types of locally stored commercials that would be appropriate for this time slot, which include: local automotive dealerships; local alcohol distributors or retailers; local financial services companies; local hardware/home improvement stores; local sporting goods stores; or local restaurants.

The viewer of the football game in this example is a part of a family that includes a young married male, a young married female, an infant child, and a dog. Based upon surveys and questionnaires that were answered during configuration of the cable or satellite television system, the cable or satellite television network provider has learned of the interests and buying habits of members of the family. Using this information, the system can determine the types of commercials to be downloaded for local storage in the set top box. In this example, commercials are stored in the set top box for automotive dealerships, day care centers, jewelry stores, remodeling companies, fine art galleries, baby toy stores, and baby clothing stores.

The set top box performs a search for local commercials stored in the commercials database, first eliminating all commercials that are not of the required type. As shown in Fig. 6, the search results show four commercials that are of one of the allowable types. Of the four commercials, one commercial is for a beer distributor for a competitor of “Alco” and another commercial is for a “Force” automotive dealership that restricts the network from advertising

during the same commercial break with a beer advertisement. These are also eliminated as possibilities for insertion into the broadcast.

Of the remaining two eligible commercials in local storage, one is for another local “Force” automobile dealership and the other is for a local kitchen/bath remodeling company.

5 The header database indicates that the “Force” dealership commercial has been played often within the past several weeks, but the local kitchen/bath remodeling advertisement has received little airtime. In choosing between the eligible commercials, a determination algorithm programmed into the CPU can include a weighting feature for determining priority based upon a number of factors, including the frequency by which a commercial has been inserted, the price paid by an advertiser, the expiration date of the advertising contract, and the correlation between the product advertised in the commercial and the subject matter of the television program. The weighting of these factors can be determined or customized by the network. Based upon the algorithm as configured for the present example, the commercial for the local kitchen/bath remodeling company is inserted into the broadcast stream through the set top box. The header database then adds the airplay information to the record associated with the commercial, adjusting the frequency associated with the commercial, and, if appropriate, generating billing information for use by the network.

10 Accordingly, the set top box of the present invention for inserting locally stored commercials into a viewer’s broadcast stream allows a broadcast network to provide  
20 commercials that are more personalized to a particular user’s interests and buying habits. The system can also select commercials for local and regional companies that are located in the immediate vicinity of the viewer. The commercials that are stored in the set top box are organized in a header database according to type, length, expiration, frequency of airtime, and a

plurality of other factors to enable the set top box to insert an appropriate and effective commercial. Thus, it is readily seen that the method and system of the present invention provides for improved advertising, and maximizes the value of advertising time during breaks in television programming.

5           The description provided above for inserting locally stored advertisements can also be applied to other forms of media. For example, advertisements can be audio signals for broadcast radio, in which radio advertisements can be locally stored in radio receivers, such as home stereos, automobile radios, etc. Advertisements can also be locally stored in personal digital assistants, cellular or digital wireless telephones, or pagers, in addition to television set top  
10       boxes.

          The foregoing disclosure of embodiments of the present invention and specific examples illustrating the present invention have been presented for purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise forms disclosed. Many variations and modifications of the embodiments described herein will be obvious to one of  
15       ordinary skill in the art in light of the above disclosure. The scope of the invention is to be defined only by the claimed appended hereto, and by their equivalents.